TUFTED PUFFIN (*Fratercula cirrhata*)

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Criteria Scores

Population Trend	Range Trend	Population Size	Range Size	Endemism	Population Concentration	Threats
15	15	10	5	0	10	5

Special Concern Priority

Currently considered a Bird Species of Special Concern (breeding), Priority 1. Included on CDFG's (1992) unprioritized list and Remsen's (1978) prioritized list, Priority 2.

Breeding Bird Survey Statistics for California

Data inadequate for trend assessment (Sauer et al. 2000).

General Range and Abundance

No subspecies are recognized. Breeds along the Pacific coast of North America from the Bering Sea south to the California Channel Islands, and along the Pacific coast of Asia from northeastern Siberia south to Hokkaido, Japan (AOU 1998, Gaston and Jones 1998). At sea during the breeding season, occurs from the outer continental shelf to waters well beyond the shelf break. During the non-breeding season, occurs widely in pelagic waters from southern Alaska and Kamchatka south to southern California and southern Japan. The world breeding population numbers roughly 3.5 million birds, with most birds breeding on the Aleutian Islands and Alaska Peninsula (Byrd et al. 1993).

Seasonal Status in California

Occurs year round in offshore waters near breeding colonies in central and northern California, but more common throughout the state in winter. In southern California, most numerous in mid-winter and spring (Briggs et al. 1983). Breeding season extends from late April to early September.

Historical Range and Abundance in California

Grinnell and Miller (1944) described the tufted puffin as resident and breeding from the Oregon border south to the Channel Islands. Known breeding locations included: Castle Rock (Castle Island), Del Norte County; Green and Flatiron (Off-Trinidad) rocks, Humboldt County; Bird Rock (off Tomales Point) and Point Reyes, Marin County; South Farallon Islands, San Francisco County; San Pedro Rock, San Mateo County; islet in Carmel Bay, Monterey County; islets near Port San Luis (or, Port Harford), San Luis Obispo County; Prince (off San Miguel Island), Santa Cruz, and Santa Barbara islands, Santa Barbara County; and Anacapa Island, Ventura County (Ray 1909, Grinnell and Miller 1944, Osborne 1972). In California, tufted puffins were more common in the late 19th and early 20th centuries, when thousands were reported at the South Farallon Islands in 1911 and dozens at Prince Island in 1886 (Osborne 1972, Ainley and Lewis 1974, Hunt et al. 1981). In the early to mid-20th century, numbers declined throughout California and puffins ceased to breed in the Channel Islands. Puffin declines likely were associated with oil spill mortality, reduced prey availability, changes in nesting habitats, and competition for nest sites with introduced rabbits at Southeast Farallon Island (Ainley and Lewis 1974, Hunt et al. 1981, McChesney et al. 1995).

Recent Range and Abundance in California

In 1975-1980, the entire coast of California was surveyed for breeding seabirds, including tufted puffins. From those surveys, a total of 250 breeding puffins were estimated at 13 colonies; all occurred north of Point Sur, Monterey County. However, not included in this estimate were a pair of puffins observed farther south at Piedras Blancas, San Luis Obispo County, in 1979. About 50% of the population occurred north of Cape Mendocino, Humboldt County, and 40% at the South Farallon Islands (Sowls et al. 1980). From surveys in 1989-1991, Carter et al. (1992) estimated 276 breeding puffins at 13 colonies in California. About 57% occurred north of Cape Mendocino and 25% at the South Farallon Islands. In the former area, the principle breeding sites were Prince Island (27 birds) and Castle Rock (82 birds), Del Norte County, and Green Rock, Humboldt County

(29 birds). Between Cape Mendocino and the Farallon Islands, puffins were found only at Goat Island Area (8 birds) and Fish Rocks (15 birds), Mendocino County, and Point Reyes (4 birds). In 1991, small numbers of puffins (about 10 birds) were rediscovered at Prince Island, Santa Barbara County, after an absence of several decades from the Channel Islands (Carter et al. 1992, McChesney et al. 1995). This was the only breeding location south of the Farallon Islands where puffins were found in 1989-1991. No overall trend was detected between statewide surveys in 1975-1980 and 1989-1991 (Carter et al. 1992).

Despite recent re-colonization by small numbers of birds near the southern edge of the breeding range, tufted puffins have not recovered from the declines of the early to mid-20th century. At the South Farallon Islands, numbers increased somewhat (from 54 to 100 birds between 1972 and 1982) after removal of rabbits in the early 1970s (Ainley et al. 1990a). The degree to which rabbit removal was responsible, though, is unclear as many nest sites are located in areas where rabbits did not occur. Numbers at the South Farallon Islands remained fairly stable (between about 50-80 birds) between 1982 and 1992 (Ainley et al. 1994), and fluctuated from 50 to 130 birds in 1993-2000 (Abraham et al. 2000).

In the far northern part of California, recent surveys indicate puffins may be declining. Estimates at Castle Rock dropped from 82 birds in 1989 to only 6-24 birds in 1997-1999 (Jaques and Strong 2001).

Ecological Requirements

Information on ecological requirements of the tufted puffin in California is restricted mostly to general accounts of habitat use. Puffins breed on offshore rocks and islands or, rarely, steep mainland cliffs that are largely free of mammalian predators and human disturbance. They nest either in earthen burrows or rock crevices, usually on steep slopes, cliffs or cliff tops. Crevices are used mostly when suitable soil for burrowing is unavailable, and are the primary nest sites used in central and southern California (Ainley et al. 1990a, Carter et al. 1992). Diet information in

California is available only for chicks at the South Farallon Islands, 1973-1982, when food delivered was comprised mostly of anchovies, juvenile rockfish, and squid (Ainley et al. 1990b). Studies elsewhere also indicate that young are fed mostly fish, whereas adults feed on fish, squid, and small crustaceans (Gaston and Jones 1998).

Threats

Currently, the main breeding sites are largely protected from human disturbance within the Castle Rock and Farallon Islands national wildlife refuges. In the past, habitats on the Farallon Islands and Castle Rock were altered by human occupation, but the degree to which this affected tufted puffins is poorly known (Osborne 1972, Ainley and Lewis 1974, McChesney et al. 1995). Oil pollution is believed to have been a problem in the past (Ainley and Lewis 1974) and may still be. Small numbers are likely killed in oil spills (e.g., *Apex Houston*; Page et al. 1990), but because of their pelagic distribution most oiled puffins probably don't wash ashore to be counted. A large oil spill offshore of major colonies could be catastrophic to the small state breeding population.

Climate change and reductions in prey availability also may have contributed to historical and recent declines both in California and farther north (Ainley and Lewis 1974, Hunt et al. 1981, Agler et al. 1999). Ainley and Lewis (1974) speculated that the population crash of Pacific sardines (*Sardinops sagax*) in the 1940s hindered recovery of already depleted puffin populations in California, but it is unclear if sardines were important prey of puffins (McChesney et al. 1995). Current competition with commercial fisheries is possible but affects are unknown. The major prey fed to puffin chicks at the Farallon Islands also have (or have had) large commercial fisheries in California, and a small-scale fishery has been re-instated for the recovering Pacific sardine (CDFG 2000).

At Castle Rock, competition for space with, and soil erosion by, non-breeding Aleutian Canada geese (*Branta canadensis leucopareia*) and California sea lions (*Zalophus californianus*) may result in habitat loss in the main puffin breeding area (Jaques and Strong 2001). Soil loss

caused by other species (such as cormorants) may have degraded habitat at other colonies, such as Flatiron Rock (Osborne 1972). Western gulls (*Larus occidentalis*) may prey on puffin chicks and kleptoparasitize adult puffins bringing food to chicks (Speich and Wahl 1989, Jaques and Strong 2001). This could cause major problems for puffins, particularly where small numbers nest among dense aggregations of gulls (Speich and Wahl 1989), such as at Castle Rock and the South Farallon Islands.

Management and Research Recommendations

- Focus on protection of offshore rocks and islands used for nesting from human disturbance and introduction of mammalian predators.
- Conduct studies to develop better breeding population estimates from bird count data. Since numbers visible at a colony vary greatly, estimates based on one or a few counts can be highly inaccurate. Studies should include conducting counts at several colonies during different times of day throughout the breeding season, combined with an assessment of active nests.
- Investigate threats to puffin nesting habitat by Canada geese and California sea lions at Castle Rock, including measures to protect and restore habitat where feasible.
- Research is needed on nesting and foraging ecology in California. However, very few (if any) colonies exist where detailed studies can be conducted safely and without disturbance to nesting seabirds and marine mammals. Probably the only location where any studies could be conducted is Southeast Farallon Island. Updated information on food delivered to young may be achievable and would be of value from that colony.

Monitoring Needs

The California breeding population should be surveyed periodically (at least every ten years), during average or above average climatic conditions (e.g., non-El Niño years). Surveys should be

conducted in the morning during the peak of the breeding season (May to July). Annual monitoring of breeding population size and chick production (where feasible) should be continued at the state's two largest colonies at the South Farallon Islands and Castle Rock. Similar monitoring should be attempted at other colonies, such as Prince Island (Del Norte County), Puffin Rock, Green Rock, Goat Island Area, and Prince Island (Santa Barbara County).

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